Commonwealth of Kentucky
Division for Air Quality

PERMIT STATEMENT OF BASIS

TITLE V (DRAFT PERMIT) NO. V-04-042 (REVISION 1)
LAFARGE NORTH AMERICA
SILVER GROVE, KY

November 8, 2005

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Source I.D. #: 021-037-00090
Source A.I. #: 591
Activity #: APE20050002

SOURCE DESCRIPTION:

Lafarge operates a synthetic gypsum wallboard forming facility in Silver Grove, Kentucky. The facility, which commenced operation on June 25, 2000, produces wallboard from synthetic gypsum (calcium sulfate dihydrate [$CaSO_4 \cdot 2H_2O$]). Synthetic gypsum is a beneficial by-product of the flue-gas desulfurization systems of power plants.

In the process, gypsum is first dried in a dryer and then sent to a calciner. The resulting stucco is then mixed with various additives and foaming agents to form a slurry, which is fed between paper layers on a forming line to make a continuous board. The wallboard attains firmness as the gypsum begins to recrystallize on the forming line. The board is then passed through a dryer to remove excess water. The boards are then trimmed, marked and stacked.

The Silver Grove facility generates airborne pollutants, primarily from combustion of natural gas and from the handling and processing of gypsum, stucco, and other materials. Low-NO_X burners are employed in all of the combustion units, which are exclusively fired on natural gas. Material processing and conveying systems are equipped with integrated baghouse systems to capture products and minimize emissions. The potential for fugitive PM emissions from gypsum storage and vehicle movements on roads is minimized through established work practices that are executed in accordance with written procedures stipulated in the permit.

Source Classification

The Silver Grove facility is located within the northern Kentucky portion of the Metropolitan Cincinnati Interstate Air Quality Control Region. This area is currently designated as in attainment or unclassifiable for all criteria pollutants except for ozone and fine particulate matter less than 2.5 microns ($PM_{2.5}$). The Cincinnati area was designated as nonattainment with respect to the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) effective June 15, 2004. Both VOC and NO_X are regulated as precursors to ozone. At the time the original permit action for the Silver Grove facility was completed in 1999, the area was also a nonattainment area under the 1-hour average ozone NAAQS, which is no longer in place. (The area was re-designated to attainment of the 1-hour standard in August 2002.)
Gypsum processing is not on the list of 28 Prevention of Significant Deterioration of Air Quality

(PSD) source categories defined at 401 KAR 51:001, Section 1 (120)(a)(1)(b). Thus, the major source threshold for attainment pollutants under the PSD program is 250 tpy. Fugitive emissions are not counted towards this total in determining the source status per 401 KAR 51:001, Section 1 (120)(c). Without any constraints on production rates or other process variables, potential emissions of total particulate matter (PT), particulate matter less than 10 microns (PM_{10}), carbon monoxide (CO) and sulfur dioxide (SO_2) for the existing plant are less than the 250 tpy major source threshold. Performance emission testing is performed annually in accordance with the permit to verify emission levels of CO. (All other PSD regulated pollutants are well below thresholds). Historical tests have demonstrated that existing actual CO emission levels for the existing plant are below the major source thresholds, confirming the plant's true minor status. Thus, the facility is an existing minor source for 401 KAR 51:017 (PSD) purposes.

The major source threshold under the Nonattainment NSR program is 100 tpy for VOC and NO_X. Potential VOC and NO_X emissions of the existing plant at maximum equipment capacities are less than the 100 tpy for VOC but more than a 100 tpy for NO_X. In order to preclude applicability of 401 KAR 51:052 (nonattainment NSR), Lafarge has accepted limits for NO_X emissions. As with CO, annual emission testing on the major combustion systems for NO_X has to be done to confirm that emissions are kept less than the threshold. VOC emissions, which are set on a mass balance basis, are well below the threshold. After the proposed modifications, the facility will be classified as a major source per 401 KAR 51:001 definitions for its emission of $PM_{2.5}$ and NO_X

With respect to $PM_{2.5}$, the Cincinnati area (including Campbell County) was recently designated as a nonattainment area under the new $PM_{2.5}$ NAAQS effective April 5, 2005. On September 8, 2005, EPA published a proposed implementation rule for the $PM_{2.5}$ standards. Kentucky has until April 8, 2008 to develop a State Implementation Plan (SIP) to implement the new NAAQS. For the interim period, EPA issued a memorandum on April 6, 2005 advising states to use existing PM_{10} nonattainment NSR programs as a surrogate for $PM_{2.5}$ until SIPs are revised accordingly. This memo also provides that for sources whose particulate emissions are predominately coarse, the $PM_{2.5}$ fraction of PM_{10} emissions can be quantified using emission tests or other reasonable data. Lafarge has conservatively assumed that all PM emissions from combustion sources are in the form of $PM_{2.5}$. Lafarge estimated $PM_{2.5}$ potential emissions from non-combustion processes based on an assumed ratio of $PM_{2.5}$ to PM consistent with particle size distribution data published by EPA for the major process units in gypsum manufacturing industry. Lafarge also conducted stack tests on the three major PM emission sources to verify these ratios. Based on this data, Lafarge has demonstrated that potential $PM_{2.5}$ emissions from the existing plant are less than 100 tpy, and thus the facility is a minor source for 401 KAR 52:052 purposes for $PM_{2.5}$. Pursuant to 401 KAR 50:012, General Application, the Division requested a Reasonable, Available, and Practical (RAP) control technology analysis for sources emitting $PM_{2.5}$. The provided RAP analysis evaluated wet scrubbers, electrostatic precipitators, and fabric filter baghouses as commercially available control technologies for PM; reaching to the conclusion that in the gypsum industry, baghouses are considered Best Available Control Technology (BACT) and thus represent RAP.

The Silver Grove facility is a major source under the Title V permitting program as potential emissions of both PM_{10} and CO exceed 100 tpy.

Air Permitting History

Title V permit V-99-017 was issued September 2, 1999 covering the construction and operation of the Silver Grove facility. Revision 1 to the Title V permit was issued June 30, 2003 incorporating new fugitive control measures and authorizing proposed modification to the existing wallboard line and installation of an additional building enclosure for raw gypsum storage. Permit V-04-042, a renewal to the initial Title V permit, was issued on January 27, 2005.

Proposed Construction Project

Lafarge is proposing the installation of a new wallboard production line at the Silver Grove facility. The new line is similar in design, function, and capacity as the original production line. The major new equipment that will be installed as part of the proposed project consists of the following:

- Two gypsum flash dryers and associated feed bins and conveyors
- Three calcining systems and associated feed bins and conveyors
- Three stucco cooling systems, grinding systems, and storage bins
- Landplaster storage and milling operation
- Wallboard forming line with additives and mixing system
- Board dryer
- Sawing and trimming system with baghouse
- Starch storage silo
- Expanded conveyor from Primary Storage Building to Mill Building
- Additional conveyor sections in the outdoor storage area.

Lafarge will also expand the capacity of the existing Secondary Storage Building. The footprint of the building will be extended to the west of the existing structure, increasing the amount of gypsum that can be stored by approximately 20,000 tons. The function and purpose of the Secondary Storage Building will remain the same. The expansion will allow Lafarge to store a greater volume of gypsum indoors.

The proposed project did not trigger any nonattainment NSR or PSD permitting requirements as the existing plant is a synthetic minor source and potential emissions associated with the proposed project are less than the major source thresholds. This permit action is being processed as a significant revision to the Title V permit given the number of new emission units involved, some of which are subject to New Source Performance Standards, and the need to establish periodic monitoring provisions for these units.

The proposed equipment for gypsum drying, gypsum calcining, stucco cooling, and board drying is of the same type and configuration as corresponding equipment in the existing plant. The same federal and state air regulations applicable to the existing equipment will be applicable to the corresponding new equipment, and the new equipment will be regulated in the same fashion.

COMMENTS:

Type of Control and Efficiency:

The dryers, calciners, and stucco cooling systems associated with the new wallboard line will all be

equipped with high efficiency baghouses to recover the gypsum and stucco material air conveyed through the process. Thus, particulate matter (PM) emissions will be minimized and released at levels below applicable requirements under 401 KAR 59:010 and the New Source Performance Standards. The dryers, calciners, and board dryer will all be equipped with low NO_X burners and will be exclusively fired on natural gas, minimizing NO_X, CO, and SO_2 emissions.

Emission Factors and Their Source:

NO_X and CO emissions are minimized through equipment design and operation. Since there are no add-on control devices necessary for NO_X or CO, potential emissions on a short-term basis are set at the maximum expected emission rate with a suitable compliance margin. NO_X and CO emission factors are derived from information provided by the equipment vendors, reference publications (i.e., EPA's AP-42 compilation document), and results of stack tests performed on the existing equipment at the Silver Grove facility and a sister facility of the same design in Palatka, Florida. For other products of combustion (i.e., VOC, SO_2, HAP), emission factors are based on AP-42.

Emission factors for combustion by-product emissions from small diesel engines on-site for emergency power generators, fire pumps, and gypsum screening equipment were also taken from AP-42. Potential annual emissions from the gypsum screening equipment engine were previously based on how much recycle material was available to be processed. The Division has determined that an operating limit on hours of operation for the screening equipment diesel engine will be established in the permit to more definitively set the potential emissions and preclude applicability of 401 KAR 51:052. The limit will be conservatively set at 2,920 hours per year (12-month rolling average), which is equivalent to operating 8 hours per day on average each day of the year.

PM/PM_{10} emission factors for NSPS-regulated equipment have been analyzed and set based on numerous PM stack tests conducted at the facility. Emission factors for equipment not regulated by an NSPS are based on estimates of exit loadings in consideration of the air-to-cloth ratios and vendor guarantees. The baghouse systems at the plant are all designed to maximize recovery of materials through the process. Many of the bins and silos at the facility are located inside the plant buildings and exhaust through integrated bin vent filter systems to the interior of these buildings. The degree of capture by building enclosures is taken into account in PM emission estimates. No emissions are attributed to interior venting bins located in those portions of the plant that are under negative pressure, as no releases to the atmosphere occur.

$PM_{2.5}$ emissions are estimated based on general particle size distributions published by EPA in AP-42 and knowledge of the particle size distribution of the actual gypsum received at the facility. Additionally, Lafarge has conducted emission tests for $PM_{2.5}$ for the three largest PM emission sources at the plant to validate these factors.

Applicable Regulations:

The source is subject to:

1. 40 CFR 60 Subpart OOO as adopted by Regulation 401 KAR 60:670, *Standards of Performance for Nonmetallic Mineral Processing Plants*.

2. 40 CFR 60 Subpart UUU as adopted by Regulation 401 KAR 60:005, Section 3 (rrr), *Standards of Performance for Calciners and Dryers in Mineral Industries*.

3. 401 KAR 59:010, *New Process Operations*.

4. 401 KAR 63:010, *Fugitive Emissions.*

5. 401 KAR 50:012, *General Application*.

The Cage Mill Dryers' primary purpose is to reduce the free moisture content of the gypsum prior to being calcined. Although these Dryers are not primarily used for size reduction, the Division has made a determination that the equipment can and does function as such. Thus, the Cage Mill Dryers are not subject to NSPS Subpart UUU as they are combination dryers/crushers and 40 CFR 60.730(b) exempts grinding equipment that also does drying. This is consistent with US EPA determination Control Number NR16, where a partial usage was determined to be consistent with an exemption. The Cage Mill Dryers are subject to NSPS Subpart OOO. Both regulations have comparable requirements for emission controls.

The Imp Mill Flash Calciners are calciners that also perform size reduction. Upon review of the background material for NSPS Subpart UUU where similar calciners were incorporated into the standard, the Division has determined that it is consistent with the regulations for the Subpart UUU emission standard to apply to the Imp Mill Flash Calciners.

A RAP analysis has been provided in order to fulfill 401 KAR 50:012 requirements.

Regulations Not Applicable:
40 CFR 64, Compliance Assurance Monitoring, does not apply. No units have potential pre-control device emissions of a regulated air pollutant equal or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

Emission and Operating Caps Description:

The existing production line does not have the potential to exceed the PSD major source thresholds. In order to remain below the nonattainment NSR major source thresholds, the following emission point is subject to federally-enforceable synthetic minor limits:

Emission Point	Description	Pollutant	Synthetic Minor Limit
EU37	Recycle Material Processing Operation	NO_X	2,920 hours

The Division has determined that the sum total of emissions associated with the proposed new wallboard production line do not have the potential to exceed the PSD and nonattainment NSR major source thresholds. NO_X and CO emission levels from combustion systems are calculated based on emission factors derived from multiple stack tests that have been conducted at the Silver Grove facility and sister facilities within Lafarge employing similar equipment. The emission factors are intended to capture the highest anticipated emissions under normal operation conditions. The burner technology employed and emission levels achievable are consistent with current state-of-

the-art technology. To continue to validate that NO_X and CO emissions from the original plant and the proposed wallboard production line are each less than the PSD or nonattainment NSR major source thresholds, the Division requires annual testing of NO_X and CO and that records be kept of routine and non-routine maintenance on the burners and hours of operation for the Recycle Material Processing Operation (EU37). Emissions of all other pollutants will be well below applicable major modification thresholds.

PERIODIC MONITORING:

Performance tests will be required on all new PM/PM_{10} sources along with annual CO and NO_X testing for the combustion sources. Monitoring of the larger PM sources will include daily visual observations and checks of baghouse differential pressures. Monitoring for the smaller PM units will consist of a weekly check and log of differential pressures.

Fugitive dust control practices are documented through daily logs, which cover assessment and control work practices stipulated by the permit, such as storage pile moisture content analyses, storage pile watering, road inspections and watering. Lafarge is also required to maintain a wind screen barrier that extends from the gypsum storage pile to the mixer basin.

CREDIBLE EVIDENCE:

This permit contains provisions which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has only adopted the provisions of 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12 into its air quality regulations.